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(54) Guiding cut strips along roller track centreline during tyre formation

(57) Cut strips (12) moving along roller track (13) are centred relative to the track by a sensor (22) monitoring one edge of the strips (12) and causing displacement of the sensor (22) and guide rollers (17) so that the guide rollers (17) and the sensor (22), and consequently the edges of the strips (12), are maintained equidistant either side of the centreline (14). The rollers of the roller track are skewed at about 89° to the centreline (14). Sensor (22) is photoelectric, infra red or ultrasonic and controls motor (23) driving the double threaded spindle (20) to displace the sensor (22) and guide rollers (19). The strips are wound onto drum (11) to form a radial tyre and the centrelines of different width strips are maintained central of the drum (11).

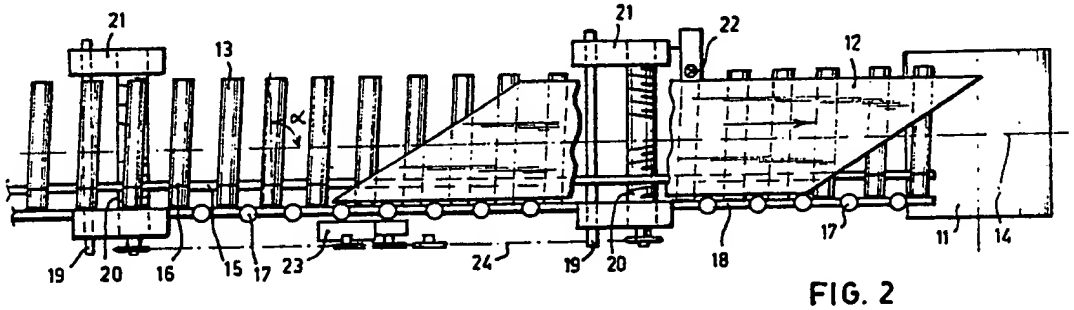

FIG. 2

GB 2 090 234 A

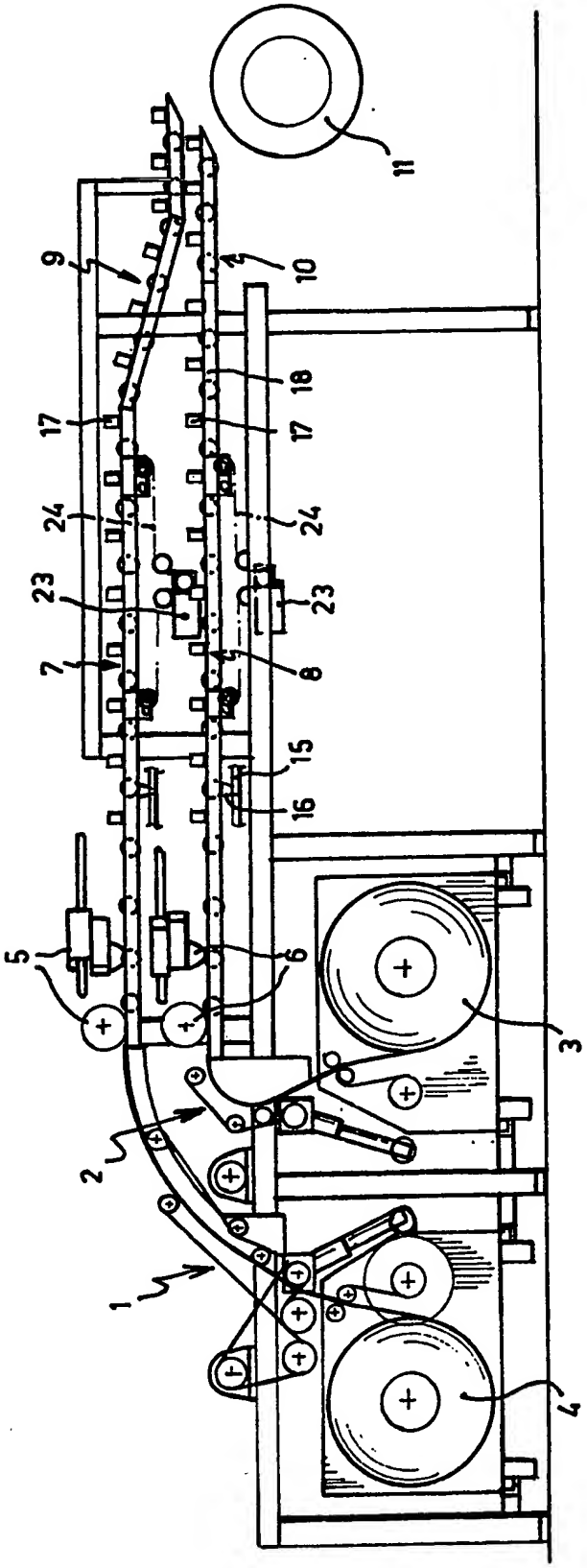

FIG. 1

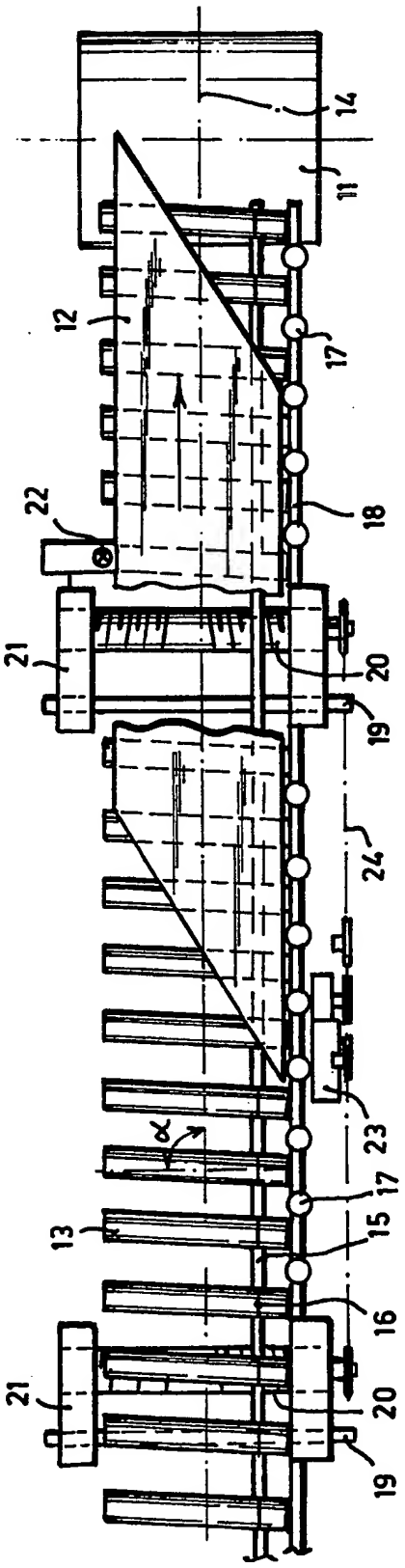

FIG. 2

SPECIFICATION

A centering mechanism

The pr sent inventi n relates to a centering mechanism for continuously centering a moving strip with respect to a centerline, wherein the mechanism is provided with a series of support rollers forming a roller track to support the strip to be conveyed, guide rollers positioned along the roller track to guide the strip and adjustment means to adjust the position of the guide rollers continuously in such a way that the longitudinal central axis of the strip coincides with the centerline.

The invented centering mechanism is particularly designed for use in a device for bringing steel breaker strips onto a building drum to build a carcass for a radial type tyre on said drum. The radial type tyres are designed as pneumatic tyres for vehicles.

In order to obtain as a final product radial type tyres, it is necessary that the weight of the steel breaker strips is equally distributed over the tyre. In order to achieve such an equal distribution, the steel breaker strips have to be brought onto the building drum in a well centered manner. However, the width of steel breaker strips vary in a slight manner, for instance variations of 1.6 to 3.2 mm. Notwithstanding these variations, an applying device should, however, be able to arrange the steel breaker strips accurately widthwise centered onto the building drum, so as to be able to achieve a stable rotating radial type tyre as final product. However, known applying devices are not able to provide the required accurately centered arrangement of, widthwise somewhat irregular, steel breaker strips on the drum.

That is why it is an object of this invention to provide a mechanism by which steel breaker strips can be arranged on a building drum in an accurately centered manner notwithstanding somewhat irregular width of these strips.

For that purpose the invented device is characterized in that the support rollers are skewed relative to the centerline of the roller track and the guide rollers are arranged only at one side of the roller track, and in that the adjustment means comprise a sensing device arranged at the other side of the roller track to sense the adjacent edge of the strip and moreover comprise displacing means coupled both with the sensing device as well as with the guide rollers for displacing the sensing device and the guide rollers in such a way that the sensing device and the guide rollers are continuously equidistant relative to the centerline.

Preferably the invention is moreover characterized in that the sensing device is electrically c nnected to switches for controlling a motor, and in that a spindle, adapted to be driven by th motor, is pr vided with a thr aded portion t r ciprocally displace th sensing devic transversely to th r ller track, the remainder f the spindle being threaded for causing movement in opposite directi n relative t the first mentioned thread, to recipr cally displace a frame transversely to the r ller track, th guide r llers being s cured on said frame.

A special embodiment of the invented device is characterized in that the support rollers each enclose an angle of approximately 89° with the centerline.

The invention will be further indicated in the following description of an embodiment, illustrated in the drawing.

Figure 1 is a schematic side view of a device for building a carcass for a radial type tyre, wherein said device is provided with the invented centering mechanism.

Figure 2 is a schematic top plan view of the invented centering mechanism.

The device, illustrated in figure 1, for building a carcass for a radial type tyre consists of two similar receiving and conveying devices 1 and 2, which serve each for receiving a steel breaker strip from an exchangeable case 3, 4 respectively. Each of these strips is automatically stretched by the receiving and conveying device 1, 2 respectively, and passed to a mechanism 5, 6 respectively for cutting the delivered steel breaker strip into pieces with the correct length. Such a piece of steel breaker strip 12 is illustrated in top plan view in figure 2. The steel breaker strip pieces are conveyed by the roller conveyor 7, 8 respectively, to a pivotable end conveyor 9, 10 respectively, which are pivoted by turns from the position, illustrated in figure 1 into a position in which the end conveyor 9, 10 respectively, tangentially meets a building drum. The supplied steel breaker strips are wrapped about the drum 11 one by one so that on the drum a pack of superimposed layers of steel breaker strips is built. After completing the pack and positioning a tread on the pack, the resulting assembly of strips and tread is removed from the drum 11 so as to be further completed to form a radial type tyre for a vehicle with pneumatic tyres. The above described device is substantially known, except for a mechanism for centering the pieces of steel breaker strips 12 on the conveyors 7, 8 respectively.

The invented centering mechanism is illustrated in figure 2 in top plan view. It is clear that each of the conveyors 7, 8 respectively is provided with its own centering mechanism, to be described hereinafter. As illustrated in figure 2 the combined support rollers 13 form a roller conveyor 7, 8 respectively, wherein the support rollers are disposed in a horizontal plane, but are skewed relative to the longitudinal central axis 14 of the roller conveyor. This skewed position of the support rollers can be achieved in that the support rollers 13 enclose an angle α of for instance 89° with the longitudinal central axis of the roller c nveyor. For clearness sake the skewed position of th support rollers 13 is exaggerated in figure 2. Said support rollers 13 carry pieces of steel breaker strips 12 and ne such strip is illustrated in figure 2. Th support rollers 13 are each driven by a drive shaft 15 via an endless belt 16. Because

the support rollers 13 are driven, the piec of st el breaker strip 12 is propelled in the general directi n of the arr w in figure 2, and because of the skewed position of the support rollers the direction of transportation comprises a component pointing towards the lower edge of the drawing.

The invented centering mechanism is also provided with freely rotatable guide rollers 17 which are arranged in a series parallelly to the longitudinal central axis 14 of the roller conveyor 7, 8 respectively, and which are for instance positioned vertically, so perpendicularly to the plane through the support rollers 13. Because the direction wherein the piece of steel breaker strip 12 is propelled by the support rollers 13 comprises a component pointing towards the lower edge of the drawing, the piece of steel breaker strip 12 is propelled with its one longitudinal edge against the guide rollers 17, so that the piece of steel breaker strip is forced to move along the guide rollers and thereby along the longitudinal central axis 14 of the conveyor 7, 8 respectively.

The guide rollers 17 are all secured on a frame 18 which is slidably parallel to itself and to the longitudinal central axis of the conveyor 7, 8 respectively and which is mounted on at least one guide bar 19. The frame 18 furthermore also threadedly engages a threaded portion on a spindle 20.

A support 21 engages, with its threaded portion, the other end portion of the spindle 20, and the threads of the threaded part of that end portion of the spindle are directed opposite to the threads of the threaded portion on that part of the spindle 20, which cooperates with the frame 18 so that then the spindle 20 is rotated in the one direction, the support 21 and the frame 18 are moved towards each other, whereas upon rotation of the spindle 20 in the other direction, the support 21 and the frame 18 are moved away from each other.

The support 21 is also slidably supported by the guide bar 19 and is provided with a sensing device 22, for instance a photocell, destined to sense the position of the adjacent longitudinal edge of the piece of steel breaker strip 12. The photocell is electrically connected to a switch to switch a motor on and off and to determine the direction of rotation of said motor 23 which drives the spindle 20 via a belt 24. In each conveyor 7, 8 respectively, preferably two assemblies, each comprising a guide bar 19 and a spindle 20, are used, and wherein the motor 23 drives the two spindles 20 via the belt 24.

The operation of the invented centering mechanism is as follows. One starts from a situation in which the photocell 22 and the frame 18 with the guide roll rs 17 ar equidistant from the centerline 14 and in which the adjacent edge of the piece of steel break r strip 12 occupies a central position relativ to the phot cell 22. If subs quently the conveyor 7 or 8 respectively, supply a narrower piece of steel breaker strip 12, the photocell 22 will receiv m re light because, since the steel breaker strip is forced against the guide rollers, the strip will leave a larger part f the ph tocell uncover d. Therefore the photocell 22 will switch-on the motor 23 in such a directi n of rotation that the spindle 20 is rotated in the direction causing the photocell 22 to move towards the adjacent edge of the piece of steel breaker strip 12. Simultaneously, because of this very rotation of the spindle 20, the frame 18 with the guide rollers 17 is shifted in the direction of the photocell so that also the piece of steel breaker strip 12 is moved towards the photocell. This shifting action is terminated at the moment the adjacent edge of the piece of steel breaker strip occupies a central position again relative to the photocell 22, after which the motor 23 is switched-off by the photocell 22. Since during said shifting action both the photocell 22 and the frame 18 are moved towards the central line 14 up to the same extent, the longitudinal central axis of the piece of steel breaker strip 12 will coincide with the centerline 14 upon termination of the shifting action.

If subsequently a wider piece of steel breaker strip 12 is supplied by the conveyor 7 or 8, then a larger part of the photocell 22 will be covered by the steel breaker strip so that the photocell receives less light. Therefore the photocell 22 will switch-on the motor 23 in such a direction of rotation that the spindle 20 is rotated in the direction causing displacement of the photocell 22 away from the adjacent edge of the steel breaker strip 12. Simultaneously, by this very rotation of the spindle, the frame 18 and the guide rollers 17 are shifted away from the photocell 22 so that also the piece of steel breaker strip 12 is moved away from the photocell. This shifting action is terminated at the moment that the adjacent edge of the piece of steel breaker strip 12 occupies the central position relative to the photocell 22 again, and then the motor 23 is switched-off by the photocell. Since during said shifting action both the photocell 22 and the frame 18 is slid away from the centerline 14 up to the same extent, the longitudinal centerline of the piece of steel breaker strip 12 will coincide with the centerline 14 upon termination of this shifting action. The centerline extends through the central perpendicular plane of the drum 11, so that the centered steel breaker strip will arrive in a position, central to the drum 11, notwithstanding the differences in width of the pieces of steel breaker strip 12.

It goes without saying that instead of the photocell 22 also other sensing devices may be used, like for instance an infrared cell or an ultrasonic sensing means.

CLAIMS

1. A mechanism for continu usly centering a moving strip with respect to a centerline, wherein the mechanism is provided with a series of support rollers forming a roller track to support the strip to be conveyed, guide rollers positi ned along the roller track to guide the strip and adjustment means to adjust the position of the

guide rollers continu usly in such a way that the longitudinal central axis of the strip coincides with the centerline, characterized in that the support rollers are skewed relative to the centerline of the roller track and the guide rollers are arranged only at one side of the roller track, and in that the adjustment means comprise a sensing device arranged at the other side of the roller track to sense the adjacent edge of the strip, and moreover comprise displacing means coupled both with the sensing device as well as with the guide rollers for displacing the sensing device and the guide rollers in such a way that the sensing device and the guide rollers are continuously equidistant relative to the centerline.

2. A centering mechanism according to claim 1, characterized in that the sensing device is electrically connected to switches for controlling a motor, and in that a spindle, adapted to be driven by the motor, is provided with a threaded portion to reciprocally displace the sensing device transversely to the roller track, the remainder of the spindle being threaded for causing movement in opposite direction relative t the first mentioned thread, said movement consisting f reciprocally displacing a frame transv rsely t th r ller track, the guide rollers being secured on said frame.

3. A centering mechanism according to claim 1 or 2, characterized in that the support rollers each enclose an angle of approximately 89° with the centerline.

4. A centering mechanism according to any of the preceding claims, characterized in that the centering mechanism is used in a device for bringing steel breaker strips onto a building drum to build a carcass for a radial type tyre on said drum, said radial type tyre being destined as pneumatic tyre for a vehicle.

5. A center mechanism according to any of the preceding claims, characterized in that the sensing element is a photocell.

6. A centering mechanism constructed and arranged substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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